



Hull 5-4-1-4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application

5 Applicant(s): Hull et al.
Case: 5-4-1-4
Serial No.: 09/251,998
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Group: 2143
10 Examiner: David E. England

I hereby certify that this paper is being deposited on this date with the U.S. Postal Service as first class mail addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

Signature: Date: August 9, 2005

Title: Eager Evaluation of Tasks in a Workflow System

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CORRECTED SUPPLEMENTAL APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
20 P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

25 This Corrected Supplemental Appeal Brief is submitted in response to the Office Action dated July 14, 2005 in order to include an appendix containing the claims pending in the prosecution. The Supplemental Appeal Brief was originally submitted in response to the Office Action dated December 1, 2004 in the above-referenced application, in which the Examiner reopened prosecution in response to the Supplemental 30 Appeal Brief filed February 10, 2004.

Applicants have submitted concurrently herewith a response to the Office Action, requesting reinstatement of the appeal.

REAL PARTY IN INTEREST

35 The present application is assigned to Lucent Technologies Inc., as evidenced by an assignment recorded on May 21, 1999 in the United States Patent and Trademark Office at Reel 9970, Frame 0945. The assignee, Lucent Technologies Inc., is the real party in interest.

RELATED APPEALS AND INTERFERENCES

A Notice of Appeal was filed on October 21, 2003 in related United States Patent Application, Serial No. 10/274,579, and an Appeal Brief was filed in that application on December 23, 2003.

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STATUS OF CLAIMS

The present application was filed on February 19, 1999, with claims 1-31. In a response to a restriction requirement, Applicants elected to prosecute claims 1-21. Consequently, claims 1-21 are currently pending. Claims 1 and 12 are independent 10 claims. Claims 2-11 depend from independent claim 1, while claims 13-21 depend from independent claim 12.

The drawings were objected to under 37 CFR 1.83(a) for not showing every feature of the invention specified in the claims, and claims 1-21 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly 15 point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1-3, 5, 9, 12-14 and 16 stand rejected under 35 U.S.C. §102(e) as being anticipated by Borkenhagen et al. (U.S. Patent No. 6,697,935, hereinafter “Borkenhagen”). Claims 4, 6, 7, 8, 15 and 17-19 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Borkenhagen in view of Boutaud et al. (U.S. Patent No. 20 6,253,307, hereinafter, “Boutaud”). Claims 10, 11, 20, and 21 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Borkenhagen in view of Van Praet et al. (U.S. Patent No. 5,854,929, hereinafter, “Van Praet”) and Smith et al. (U.S. Patent No. 5,561,762, hereinafter, “Smith”).

Claims 1-21 are appealed.

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STATUS OF AMENDMENTS

There have been no amendments filed subsequent to the final rejection.

SUMMARY OF CLAIMED SUBJECT MATTER

In a workflow system of the present invention, an object is processed through execution of a number of tasks. An exemplary workflow system is shown in 30

FIG. 1 of the drawings and is described on page 15, line 16 to page 9, line 18 of the specification. This workflow system is an object-focused workflow system that processes objects, which may be organized as modules. See, for example, page 6, lines 14-21. Modules have a number of enabling conditions associated with them. The 5 enabling conditions indicate whether a module is to be executed for the object. FIG. 2 shows a ROUTING_TO_SKILL module having a number of other modules with associated enabling conditions. FIG. 2 is described on page 9, line 19 to page 13, line 8.

Tasks are associated with modules and are referred to by their associated modules. Tasks are described, e.g., on page 39, lines 11-17. Execution of one or more of 10 the tasks results in initiation of a side-effect action performed by a component external to the workflow system. Side-effect actions are described, for instance, in reference to FIG. 4 and on page 13, line 21 to page 14, line 4. It is determined whether a task is eligible for eager execution by considering at least (1) a state of the task and (2) whether execution of 15 the task results in the initiation of a side-effect action. The task is executed using eager execution if the task is determined to be eligible for eager execution. States of tasks are described, for instance, at page 40, line 20 to page 41, line 8 and page 64, lines 11-22. Algorithms for determining states of tasks and whether tasks should be executed eagerly are described in FIGS. 34A-34D and 35A-35D and associated text (e.g., page 41, line 9 to page 64, line 22).

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STATEMENT OF GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-21 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention; claims 1-3, 5, 9, 12-14 and 16 are rejected 25 under 35 U.S.C. §102(e) as being anticipated by Borkenhagen; claims 4, 6, 7, 8, 15 and 17-19 are rejected under 35 U.S.C. §103(a) as being unpatentable over Borkenhagen in view of Boutaud; claims 10, 11, 20, and 21 are rejected under 35 U.S.C. §103(a) as being unpatentable over Borkenhagen in view of Van Praet and Smith; and the drawings are rejected under 37 CFR 1.83(a).

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ARGUMENTRejection Under 35 U.S.C. §112, Second Paragraph

As to Issue (1) presented above, the Examiner rejected claims 1-21 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Examiner asserts that it is unclear as to “what/where specifically the execution of the task resulting in an initiation of a side-effect action is included in the eligibility for eager execution.” Applicants respectfully traverse this rejection.

Applicants note that the cited claims clearly indicate that whether a task is eligible for eager execution is determined by considering whether *execution of the task results in the initiation of a side-effect action*. The specification clearly teaches that “the execution of at least some of the tasks (so-called side-effect tasks) results in the initiation of a side-effect action *performed by a component external to the workflow system.*” (Page 2, lines 26-29 of the originally filed specification; emphasis added.) Thus, the definition of a side-effect action and the utilization of such an event to determine whether a task is eligible for eager execution are clearly defined in the disclosure.

Rejection under 35 U.S.C. §102(e) Over U.S. Patent No. 6,697,935

The Examiner rejected claims 1-3, 5, 9, 12-14 and 16 under 35 U.S.C. §102(e) as being anticipated by Borkenhagen.

Claims 1 and 12

Regarding independent claims 1 and 12, the Examiner asserts that Borkenhagen teaches determining whether a task is eligible for eager execution by considering...whether execution of the task results in the initiation of a side-effect action (e.g., col. 18, lines 37-51).

Applicants note that Borkenhagen is directed to “a multithreaded processor capable of switching execution between two threads of instructions, and thread switch logic embodied in hardware registers with optional software override of thread switch conditions.” (Col. 5, lines 7-11.) In the text cited by the Examiner, Borkenhagen teaches “the priorities of the threads can be adjusted by the thread switch manager software through the use of one or more instructions, or *by hardware in response to an*

“*event.*” (Col. 18, lines 46-48; emphasis added.) Independent claims 1 and 12 require determining whether a task is eligible for eager execution by considering at least (1) a state of the task and (2) whether *execution of the task results in the initiation of a side-effect action.* The present invention considers whether the execution of a task **initiates** a side-effect action (defined in the specification as being performed by a component *external* to the workflow system), whereas Borkenhagen adjusts the priorities of threads in **response to** instructions or events. Borkenhagen does not disclose or suggest considering whether the execution of a task results in a side-action being performed by a component *external* to the system.

Thus, Borkenhagen does not disclose or suggest determining whether a task is eligible for eager execution by considering at least (1) a state of the task and (2) whether execution of the task results in the initiation of a side-effect action, as required by independent claims 1 and 12.

Claims 2 and 13

With regard to claims 2 and 13, which stand or fall together, these claims contain the limitations of “determining that a particular task whose execution results in the initiation of a side-effect action is eligible for eager execution only if it is determined that the one or more enabling conditions associated with the particular task will evaluate to true as determined by the state of the particular task.”

Applicants respectfully submit that, while Borkenhagen does describe a number of states for a task, there is no teaching in Borkenhagen of determining that one or more enabling conditions associated with the particular task will evaluate to true as determined by the state of the particular task. Applicants define enabling conditions in independent claims 1 and 12 (from which dependent claims 2 and 13, respectively, depend) as “one or more of said tasks each having one or more associated enabling conditions indicating whether the task is to be executed for said object.” See also page 2, lines 24-26 of the present specification. There is no determination that an enabling condition for a task in Borkenhagen will evaluate to true as determined by the state of the task. Even if Borkenhagen does determine that an enabling condition for a task will evaluate to true, this determination is not made by using state of the task in Borkenhagen.

There is no disclosure in Borkenhagen of tasks that have enabling conditions as defined by and used in independent claims 1 and 12 and dependent claims 2 and 13. Consequently, Applicants respectfully submit that dependent claims 2 and 13 are patentable over Borkenhagen, alone or in combination.

5 Claims 3 and 14

With regard to claims 3 and 14, which stand or fall together, each of these claims has the limitations of “determining that a particular task whose execution does not result in the initiation of a side-effect action is eligible for eager execution prior to determining that the one or more enabling conditions associated with the particular task
10 will evaluate to true as determined by the state of the particular task.”

Applicants can find no disclosure in Borkenhagen that Borkenhagen determines that a task is eligible for eager execution prior to determining that an associated enabling condition will evaluate to true, as claimed in dependent claims 3 and 14. Consequently, Applicants respectfully submit that dependent claims 3 and 14 are
15 patentable over Borkenhagen.

Claims 5 and 16

With regard to claims 5 and 16, which stand or fall together, these claims have the additional limitations of “wherein said step of determining whether a task is eligible for eager execution is performed by also considering (3) whether the task
20 contributes to the production of a target value.” The Examiner asserts that Borkenhagen discloses this limitation (col. 3, line 55, to col. 4, line 6).

Applicants respectfully disagree. Applicants could find no disclosure or suggestion in Borkenhagen to determine whether a task contributes to the production of a target value. In fact, Applicants could find no disclosure or suggestion by Borkenhagen
25 of a target value.

Consequently, Applicants respectfully submit that dependent claims 5 and 16 are patentable over Borkenhagen, alone or in combination.

Rejection under 35 U.S.C. §103(a) Over U.S. Patent No. 6,697,935 inView of U.S. Patent No. 6,253,307

With regard to Issue (3), the Examiner rejected claims 4, 6, 7, 8, 15 and 17-19 under 35 U.S.C. §103(a) as being unpatentable over Borkenhagen in view of
5 Boutaud.

Claims 4 and 15

With regard to claims 4 and 15, which stand or fall together, these claims add the limitation of “partially evaluating one or more enabling conditions associated with said task.” The Examiner points to col. 45, line 58 to col. 46, line 51 of Boutaud as
10 teaching this limitation. Applicants read the cited sections of Boutaud as describing “conditional instructions” that can be or not be executed based on a condition. See, for instance, col. 46, lines 13-25 of Boutaud. Applicants respectfully submit that the cited text of Boutaud does not disclose any item that is partially evaluated. For example, if a
15 condition in Boutaud is true, then certain conditional instructions are executed; if a condition in Boutaud is false, then those certain conditional instructions are not executed. See col. 46, lines 20-25 of Boutaud.

By contrast, an enabling condition of the present invention can be partially evaluated. For example, FIG. 20 shows the enabling condition “*cust_value < 7* and *DNIS not = ‘Australia_promotion’*.” The “*cust_value < 7*” part of the enabling condition could
20 be evaluated, which means that only part of the enabling condition “*cust_value < 7* and *DNIS not = ‘Australia_promotion’*” would be evaluated. In Boutaud, the conditional instructions are either executed or not executed, and there is no partial evaluation of the conditional instructions.

Thus, Applicants respectfully submit that independent claims 4 and 15 are
25 patentable over Borkenhagen and Boutaud, alone or in combination.

Claims 6 and 17

With regard to claims 6 and 17, which stand or fall together, these claims have the limitation of “determining that a particular task is unneeded for processing of the object based at least in part on partial evaluation of an enabling condition of a second task, wherein said second task’s enabling condition depends on one or more outputs of
30 said particular task.” As described above, Applicants submit that Boutaud does not

disclose a partial evaluation of an enabling condition. Moreover, in Boutaud if a “conditional instruction” is considered to be a “task,” then there is no determination that a particular conditional instruction (i.e., “task”) is necessary based on evaluation of an enabling condition of a second conditional instruction (i.e., “task”). Instead, in Boutaud,
5 if a condition is or is not true, the “conditional instructions” are or are not executed, respectively, and conditional instructions do not depend on enabling conditions of other conditional instructions. Consequently, Applicants respectfully submit that dependent claims 6 and 17 are patentable over Borkenhagen and Boutaud.

Claims 7 and 18

10 Regarding claims 7 and 18, which stand or fall together, the same reasoning applies as in regards to dependent claims 6 and 17. Furthermore, if a “conditional instruction” in Boutaud is considered to be a “task,” Boutaud does not disclose that a particular conditional instruction (e.g., “task”) is based on evaluation of enabling conditions for a number of tasks, as conditional instructions in Boutaud either
15 are or are not executed depending on a single condition. Consequently, Applicants respectfully submit that dependent claims 7 and 18 are patentable over Borkenhagen and Boutaud.

Claims 8 and 19

20 Regarding claims 8 and 19, which stand or fall together, these claims add the limitations of “determining that a particular task is necessary for processing of the object based at least in part on evaluation of enabling conditions for a number of tasks, wherein said tasks’ enabling conditions depend on one or more outputs of said particular task.” Applicants submit that these claims are patentable for at least the reasons stated above with regard to claims 5, 6, 16 and 17. Furthermore, if a “conditional instruction”
25 in Boutaud is considered to be a “task,” then Boutaud does not disclose that a number of conditional instructions’ (i.e., “tasks”) enabling conditions depend on outputs of a particular conditional instruction (i.e., “task”), as conditional instructions in Boutaud either are or are not executed depending on a single condition. Consequently, Applicants respectfully submit that dependent claims 8 and 19 are patentable over Borkenhagen and
30 Boutaud.

Rejection under 35 U.S.C. §103(a) Over U.S. Patent No. 6,697,935 in
View of U.S. Patent No. 5,854,929 and U.S. Patent No. 5,561,762

With regard to Issue (4), the Examiner rejected claims 10, 11, 20, and 21 under 35 U.S.C. §103(a) as being unpatentable over Borkenhagen in view of Van Praet and Smith.

With regard to claims 10, 11, 20 and 21, which stand or fall together, each of claims 10 and 20 has the limitations of “a graph representing data flow dependencies and enabling flow dependencies between tasks and enabling conditions” and “propagating changes through said graph based on new outputs of completed tasks.”

Claim 11 depends from claim 10 and claim 21 depends from claim 20. Van Praet discloses a “bipartite” graph where vertices represent storage elements in a processor or operations of a processor, and where edges represent connectivity of a processor and data flow from storage. See col. 8, lines 51-57 of Van Praet. Smith discloses a graph where each node represents a logic gate and the branches represent input or output lines. See col. 5, lines 51-58 of Smith.

In the present invention, as described above, a task has one or more associated enabling conditions indicating whether the task is to be executed for an object (see, e.g., independent claims 1 and 12). Furthermore, a task can produce an output that is used in an enabling condition for another task. See, for instance, FIG. 26 and associated text on pages 36 and 37 of the present specification, where it states the following:

This diagram illustrates the data flow dependencies and the enabling flow dependencies of the workflow described above. Each of the modules (ovals) and enabling conditions (hexagons) are represented as nodes with solid line data flow edges representing data flow dependencies and broken line enabling flow edges representing enabling flow dependencies.

If a “task” of the present invention is a store element or processor of Van Praet, while Van Praet might, for sake of argument, show a data flow dependency in a graph, there is no disclosure of an enabling flow dependency in the graph. Similarly, if a “task” of the present invention is a logic gate, while Smith might, for sake of argument, show a data flow dependency in a graph, there is no disclosure of an enabling flow

dependency in the graph. In other words, in both Van Praet and Smith, only one data dependency (e.g., “edge” or “connection”) is shown between nodes, while claims 10 and 20 require two types of data dependencies. Consequently, Applicants respectfully submit that dependent claims 10 and 20 are patentable over Borkenhagen, Van Praet and Smith,
5 alone or in combination. Because claims 10 and 20 are patentable, their respective dependent claims 11 and 21 are patentable.

Rejection under 37 CFR 1.83(a)

The drawings were objected to under 37 CFR 1.83(a) for not showing
10 every feature of the invention specified in the claims. In particular, the Examiner asserts that the “determining whether a task is eligible for eager execution by considering at least (1) a state of the task and (2) whether execution of the task results in the initiation of a side-effect action” must be shown in the drawings.

Applicants note that the limitation cited by the Examiner is shown in a
15 multitude of drawings, including FIGS. 4, 6-8, 10-25 (see, enabling condition, side effect, and side effect function), 29, 30 (blocks 3022 and 3026), 36, and 37. Applicants believe that every feature of the invention specified in the claims is properly shown in the drawings.

20 Conclusion

The remaining rejected dependent claims are believed allowable for at least the reasons identified above with respect to the independent claims. Applicants respectfully submit that claims 1-21 of the present invention are patentable.

The attention of the Examiner and the Appeal Board to this matter is appreciated.

Respectfully,

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Kevin M. Mason
Attorney for Applicant(s)
Reg. No. 36,597
Ryan, Mason & Lewis, LLP
1300 Post Road, Suite 205
Fairfield, CT 06430
(203) 255-6560

APPENDIX

1. A method for operation of a workflow system for processing an object by
executing a plurality of tasks, one or more of said tasks each having one or more
5 associated enabling conditions indicating whether the task is to be executed for said
object, and wherein execution of at least one of said tasks results in initiation of a side-
effect action performed by a component external to said workflow system, said method
comprising the steps of:

determining whether a task is eligible for eager execution by considering
10 at least (1) a state of the task and (2) whether execution of the task results in the initiation
of a side-effect action; and

executing the task using eager execution if the task is determined to be
eligible for eager execution.

15 2. The method of claim 1 wherein the step of determining whether a task is
eligible for eager execution further comprises the step of:

determining that a particular task whose execution results in the initiation
of a side-effect action is eligible for eager execution only if it is determined that the one
or more enabling conditions associated with the particular task will evaluate to true as
20 determined by the state of the particular task.

3. The method of claim 1 wherein the step of determining whether a task is
eligible for eager execution further comprises the step of:

determining that a particular task whose execution does not result in the
initiation of a side-effect action is eligible for eager execution prior to determining that
the one or more enabling conditions associated with the particular task will evaluate to
true as determined by the state of the particular task.

4. The method of claim 1 wherein said step of determining whether a task is
30 eligible for eager execution further comprises the step of:

partially evaluating one or more enabling conditions associated with said
task.

5. The method of claim 1 wherein said step of determining whether a task is eligible for eager execution is performed by also considering (3) whether the task contributes to the production of a target value.

5 6. The method of claim 1 further comprising the step of:
determining that a particular task is unneeded for processing of the object based at least in part on partial evaluation of an enabling condition of a second task, wherein said second task's enabling condition depends on one or more outputs of said particular task.

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7. The method of claim 1 further comprising the step of:
determining that a particular task is necessary for processing of the object based at least in part on evaluation of enabling conditions for a number of tasks, wherein said tasks' enabling conditions depend on said particular task.

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8. The method of claim 1 further comprising the step of:
determining that a particular task is necessary for processing of the object based at least in part on evaluation of enabling conditions for a number of tasks, wherein said tasks' enabling conditions depend on one or more outputs of said particular task.

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9. The method of claim 1 wherein said step of determining is performed repeatedly during the processing of the object.

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10. The method of claim 1 wherein a memory of said workflow system stores a graph representing data flow dependencies and enabling flow dependencies between tasks and enabling conditions, said method further comprising the step of:

propagating changes through said graph based on new outputs of completed tasks.

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11. The method of claim 10 wherein said step of propagating changes is based on predefined propagation rules.

12. A workflow system for processing an object by executing a plurality of tasks, one or more of said tasks each having one or more associated enabling conditions indicating whether the task is to be executed for said the object, and wherein execution of at least one of said tasks results in initiation of a side-effect action performed by a 5 component external to said workflow system, said system comprising:

means for determining whether a task is eligible for eager execution by considering at least (1) a state of the task and (2) whether execution of the task results in the initiation of a side-effect action; and

10 means for executing the task using eager execution if the task is determined to be eligible for eager execution.

13. The workflow system of claim 12 wherein the means for determining whether a task is eligible for eager execution further comprises:

15 means for determining that a particular task whose execution results in the initiation of a side-effect action is eligible for eager execution only if it is determined that the one or more enabling conditions associated with the particular task will evaluate to true as determined by the state of the particular task.

14. The workflow system of claim 12 wherein the means for determining 20 whether a task is eligible for eager execution further comprises:

means for determining that a particular task whose execution does not result in the initiation of a side-effect action is eligible for eager execution prior to determining that one or more enabling conditions associated with the particular task will evaluate to true as determined by the state of the particular task.

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15. The workflow system of claim 12 wherein said means for determining whether a task is eligible for eager execution further comprises:

means for partially evaluating one or more enabling conditions associated with said task.

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16. The workflow system of claim 12 wherein said means for determining whether a task is eligible for eager execution further comprises:
means for determining whether the task contributes to the production of a target value.
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17. The workflow system of claim 12 further comprising:
means for determining that a particular task is unneeded for processing of the object based at least in part on partial evaluation of an enabling condition of a second task, wherein said second task's enabling condition depends on one or more outputs of
10 said particular task.
18. The workflow system of claim 12 further comprising:
means for determining that a particular task is necessary for processing of the object based at least in part on evaluation of enabling conditions for a number of
15 tasks, wherein said tasks' enabling conditions depend on said particular task.
19. The workflow system of claim 12 further comprising:
means for determining that a particular task is necessary for processing of the object based at least in part on evaluation of enabling conditions for a number of
20 tasks, wherein said tasks' enabling conditions depend on one or more outputs of said particular task.
20. The workflow system of claim 12 further comprising:
a memory for storing a graph representing data flow dependencies and
25 enabling flow dependencies between tasks and enabling conditions; and
means for propagating changes through said graph based on new outputs of completed tasks.
21. The workflow system of claim 20 wherein said memory stores predefined propagation rules and wherein said means for propagating changes further comprises
30 means for propagating changes based on said predefined propagation rules.

EVIDENCE APPENDIX

There is no evidence submitted pursuant to § 1.130, 1.131, or 1.132 or entered by the Examiner and relied upon by appellant.

RELATED PROCEEDINGS APPENDIX

There are no known decisions rendered by a court or the Board in any proceeding identified pursuant to paragraph (c)(1)(ii) of 37 CFR 41.37.